Quality Assurance Plan
Emission Inventory
For Air Operating Permit and Synthetic Minor Sources

Air Quality Program

DRAFT

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Washington State Department of Ecology
Air Quality Program

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[NOTE FOR DRAFT COPY READERS: *Alternate language is in italics and set aside in parenthesis. Please indicate preference if you have one. Thank you for your time*. SEND COMMENTS TO JAMIE CRAIGHILL, AIR QUALITY PROGRAM, DEPARTMENT OF ECOLOGY. E-MAIL **JCRA461@ECY.WA.GOV** , PHONE 360-407-6832
]

1. Quality Assurance Plan Identification and Approval

Title: Emission Inventory Quality Assurance Plan for the State of Washington Department of Ecology Air Quality Program

The Emission Inventory Quality Assurance Plan for the Air Quality Program is hereby recommended for approval and commits the Program to follow the elements described within.

_____ Date: _____
Mary Burg, Air Quality Program Manager

_____ Date: _____
Phyllis Baas, Information and Data Services

_____ Date: _____
Stan Rauh, Quality Assurance Coordinator

2. Policy Statement and Environmental Protection Agency Audit Provisions

It is the policy of the Department of Ecology's Air Quality Program to provide for the collection, storage, and use of air emission inventory data that meet high standards of precision, accuracy and data completeness, and is reasonable and comparable.

The data will be reviewed and certified as valid by the Quality Assurance Coordinator prior to being reported, delivered, or used to make decisions concerning air quality, air pollution abatement, modeling, or control measures.

(*Alternate sentence: The data will be reviewed and evaluated by the Quality Assurance Coordinator.)*

The product is an inventory of the highest quality. To insure that, this Quality Assurance Plan will provide procedures that will be implemented at various points in the inventory process. Personnel resources, including personnel trained in Quality Assurance and Quality Control procedures, have been allocated for this purpose. The Program will provide the Environmental Protection Agency with access to this Quality Assurance plan and will consider Environmental Protection Agency recommendations during annual plan updates.

3. Quality Assurance Plan Information Sources

A major source of information for this plan was the Emission Inventory Improvement Program. The Emission Inventory Improvement Program is sponsored by State and Territorial Air Pollution Program Administrators (STAPPA), the Association of Local Air Pollution Control Officers (ALAPCO), and Environmental Protection Agency. It was formed to enhance the quality of emission inventories. Documents produced by the Emission Inventory Improvement Program included discussions of emissions estimation methods, quality assurance activities, and data management systems. Ecology report 91-16, Guidelines and Specifications for Preparing Quality Assurance Project Plans was also a major source of information for this plan. Another source of information was inventory preparation/quality assurance plans prepared for carbon monoxide and ozone nonattainment areas in Washington.

3.1 How this Quality Assurance Plan fits with various types of individual inventories.

Initially, this Quality Assurance Plan will be used to guide and evaluate the annual inventory as described in the next section. Parts of this plan will be referenced or cited in Inventory Preparation Plans (IPP) which are submitted to EPA Region X for approval. This plan will be used as a template for other Quality Assurance plans related to each emission inventory conducted in the state (i.e. toxics and SIP inventories). All major point source data will be evaluated according to this plan or some approved variation. Data may be used in inventories such as State Implementation Plans (SIP), toxic, regional

haze, annual National Emission Trends (NET) and others. Details such as interaction between various groups doing entire inventories, naming those responsible for which parts of the QA/QC plan including training and checkpoints at which QA/QC will be applied will be included in individual inventory plans – both preparation plans and final reports. Individual inventory plan must be consistent with this plan.

4. Inventory Description

4.1 Historical Information

Statewide point source emissions inventory information has been maintained by Ecology since the late 1970s. The emission inventory effort has been a cooperative effort among facilities, local air authorities and the Department of Ecology. In the early days of the emission inventory, Ecology engineers and technical staff would perform many of the emissions calculations. In the past ten years, local agency and facility staff have performed an increasing number of the calculations. Today, Ecology has very little involvement in emissions calculations.

Ecology has consolidated the annual emissions from all jurisdictions into a single emissions inventory and has been responsible for federal reporting for all air operating permit and synthetic minor sources, except those under the jurisdiction of the Puget Sound Clean Air Agency (PSCAA). PSCAA has historically reported directly to the federal reporting system.

4.2 Inventory Purpose, End Use and Category

Air quality agencies are responsible for the protection of public health and welfare from the effects of air pollution. To this end, both the mandate and authority to collect information necessary to quantify pollutant discharges to the air have given to air quality agencies through federal and state regulations. Information collected is known as an emission inventory. Emissions inventories are used to support various air quality assessments. For example, emissions inventories:

- track changes and trends in air pollutant emissions;
- help in control strategy evaluation;
- serve as input to air quality simulation models;
- may be used to measure compliance with permit conditions;
- identify areas of concern; and
- set fees for pollution sources.

The end use of this inventory can be summed up to be: meeting our legal responsibilities as delegated by the federal, state and local laws, and provide a base for other air quality activities. There may be uses that are unknown at this time, but the information foundation created, in combination with the detail and documentation, will be used for future air quality activities.

Emissions inventories for major and synthetic minor sources are set at Level II inventories. The Level II definition and elements are found in EPA's Emission Inventory Improvement Program (EIIP), Volume VI, *Planning and Documentation, pages 2.1-4 through 2.1-5*. The table defining these Levels is included below. Level II inventories provide supportive data for strategic decision making or standard setting. While the intended uses of this inventory may vary, in order to meet the above stated uses, a Level II inventory is necessary. A SIP inventory is a good example of a Level II inventory; the results

of the inventory are used to support decision making, but do not require the same level of defensibility as is needed for a Level I inventory. Level I usually applies to a specific facility or source, and is generally the result of a regulation or litigation.

DEFINITION OF INVENTORY LEVELS

Inventory Levels	Inventory Use	Requirements	Example
I	Inventory supportive of enforcement, compliance, or litigation activities.	Requires the highest degree of defensibility. Generally involves source sampling or mass balance based on site-specific data; performance audits of equipment, traditional QA plan for source sampling activities.	Monitoring for compliance
II	Inventories that provide supportive data for strategic decision making or standard setting.	Site-specific (or region-specific) data are generally required, but not necessarily direct source sampling, performance audits of equipment.	State Implementation Plan (SIP) inventory
III	Inventories developed for general assessments or research that will not be used in direct support of decision making.	May or may not include direct measurement of sources, but often involves site-specific data of some type. QA requirements must be flexible.	Evaluation of effectiveness of alternative controls or mitigation methods; bench-scale or pilot studies
IV	Inventories compiled entirely from previously published data or other inventories; no original data gathering.	Flexible and variable.	Inventory developed for informational purposes; feasibility study; trends tracking

4.3 Scope

This document addresses the category of point sources that are subject to Title V of the federal Clean Air Act. Title V sources are defined in WAC 173-401. The majority of Title V sources are those:

- having the potential to emit 100 tons or more per year of any air pollutant, or
- emitting 25 tons or more per year of aggregated hazardous air pollutants, or
- emitting 10 tons or more per year of a single hazardous air pollutant.

These sources are commonly known as major sources. Major sources that accept federally enforceable limitations ensuring emission rates below those specified above are called synthetic minor sources and are included in this plan. In Washington State in 1998, there were 158 facilities that met the above criteria.

4.4 Regulatory Criteria

Title V source emission inventories are performed annually. Federal and state point source reporting requirements may be found in 40 CFR 51.321-323, RCW 70.94.151, Chapter 173-401 WAC and Chapter 173-401 WAC, and WAC 173-400-099-105, respectively. The Compliance Assurance Agreement also contains reporting requirements.

4.5 Design of Inventory Network

Individual local air authorities have been delegated emissions inventory responsibility for sources within their jurisdictions (RCW 70.94.151, WAC 173-400-099, WAC 173-400-101, Federal Register dated Nov. 11, 1994). Additionally, a multipurpose inventory tool is available in the database used by Ecology to store and process the inventory.

The Air Information Management (AIM) system has an ultimate goal of being updated through local authority electronic data submissions in a specified format that will reduce data entry and avoid a source of potential error[1].

It also offers the ability of responding to queries by multiple users, allowing broader use of the inventory when complete. Using the AIM system, Ecology will consolidate the annual emissions from all jurisdictions into a single emissions inventory, and report appropriate data to the federal reporting system.

4.6 Schedule

Title V point source inventories are conducted annually for the previous calendar year according to the following schedule (due dates are shown in parenthesis):

- Local authorities solicit information from facilities (January 1)
- Facilities supply information to local authorities (April 15)
- Local authorities forward completed inventories in the specified format to Ecology (May 31)
- Ecology performs quality control and quality assurance on the inventories (June – September)

Additional tasks are scheduled for sources under the jurisdiction of Ecology:

- Ecology compiles inventory information for facilities to verify (July 31)
- Facilities verify emissions (August 31)
- Emissions estimates are finalized (September 30)
- Submittal to Environmental Protection Agency (December 31)
- Quality Assurance final report (December 31)
- Emission Inventory Data Summary reports (December 31)

- Emission Inventory Trends report (December31)

(Alternate: remove this task from the QA plan. Trends reporting is being discussed with management and will be further discussed in Ecology's strategic planning effort. Specific commitments to frequency and scope are not appropriate at this time and do not need to be included in the QA plan.)
(Note: Emission Inventory Trends reports are prepared for the state and for the national level. National Emission Trends report is due to Mr. Puckett at EPA by July 15th.~jbc)

[1] *The intent of the above sentence is for Ecology to directly solicit electronic inventory information from the facilities, via direct mailing or a web- enabled application, process it and then report back to the local authority.*

5. Organization, Roles and Responsibilities

An effective quality assurance program requires expertise in industrial processes, emissions estimation techniques, quality assurance procedures, and data management systems. The responsibilities of all those involved in the development of emissions inventories are listed below:

5.1 Facilities

- provide complete and accurate emissions inventory information to their local authority on schedule and in an acceptable format;
- provide supporting information/documentation on emissions calculations, if requested;
- attest to the completeness and accuracy of the data (WAC 173-400-101(3);

- provide annual emissions data to permitting authority and Ecology per EPA EIIP guidance documents, where EIIP documents are available*;*

(Alternate: provide emissions data to permitting authority. While EIIP methods are probably used in a majority of the cases, EIIP was never meant to be a mandatory program. EIIP does not cover all source categories.)

- obtain an air operating permit which includes certification of truth, accuracy and completeness (major sources – WAC 173-401-520), or annually certify that potential emissions are below major source thresholds (synthetic minor sources – WAC 173-401-300(7)). For both major and synthetic minor sources, the required information for the permitting process becomes a template by which emission inventories may be compared;
- fulfill their permit conditions (source testing, operation of continuous emissions monitors, reporting and record keeping);
- conduct quality control activities on inventory data; and

- provide the Ecology Emissions Inventory Coordinator (Sally Otterson) with appropriate emission inventory documentation per the EIIP EPA guidance document. These documents are needed to conduct quality control and quality assurance activities.

(Alternate: remove the last bullet. Sources provide data to their local authority, not Ecology – see bullet #1)

5.2 Local Authority

For the remainder of this document, "local authority" is defined to include local air quality authorities:

- Benton Clean Air Authority
- Northwest Air Pollution Authority
- Olympic Air Pollution Control Authority
- Puget Sound Clean Air Agency
- Spokane County Air Pollution Control Authority
- Southwest Air Pollution Control Authority
- Yakima Regional Clean Air Authority

- Ecology's Northwest, Central and Eastern Regional offices
- Ecology's Industrial Section
- Ecology's Nuclear Waste Section;

- Operate Title V Air Operating Permit Program as delegated;
- Work with Ecology to conducting annual emissions inventory;
- Prepare and submit Inventory Preparation Plans (IPP) to Ecology;
- Assist facilities in inventory development as requested;
- Conduct quality control activities on emissions inventory data;
- Submit inventory data to Department of Ecology consistent with the *Air Quality Program Information Management Plan* and *Appendix A-Emission Inventory Information Management Plan*[2];

(Alternate: submit inventory to the Department of Ecology in a format specified by the Department of Ecology and consistent with the Air Information Management System (AIM))

- Provide the Ecology Emissions Inventory Coordinator with additional emission inventory documentation upon request.

5.3 Quality Assurance Coordinator (Stan Rauh)

- Review staff training procedures and conduct audits;
- Develop quality assurance procedures and training;
- Develop quality assurance policies, plans and procedures for emission inventory;

- Review and dis/approves Inventory Preparation Plans as they pertain to data quality issues;

(Alternate: Review and comment on Inventory Preparation Plans as they pertain to data quality issues.)

- Schedule audits, conducts audits, and reports findings;
- Develop Data Quality Assessment and Report;
- Participate in Environmental Protection Agency Data Quality Team;
- Coordinate with EPA for approval of inventory preparation plans (IPP) and individualized QA plans for SIP, toxic, and regional haze inventories.

5.4 Engineering/Inventory Coordinator and Staff

- For state sources, conduct annual emissions inventory;

- Organize, schedule and/or complete emissions inventory procedures including Data Attribute Rating System (DARS) scoring.

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[2] *These documents are in draft and are available for review. The documents include 1) direct solicitation of inventory information from the facilities by the Ecology, and 2) Ecology approval of data management plans for inventory data collection.*

(Alternate: Organize, schedule and/or complete emissions inventory procedures.)

- Perform and document computerized quality control checks not able to be automated or computerized;
- Assist facilities in inventory development;
- Conduct quality control activities on inventory data;
- Provide the Ecology Quality Assurance Coordinator (Stan Rauh) with appropriate emission inventory documentation including Inventory Preparation Plans (IPP) per *EPA Guidance Document*.
- Data analysis; and

- Data reporting-prepare an annual data summary and an annual trend report.

(Alternate: Do not include trends reporting in the QA Plan. See prior comments on trends reporting.)

5.5 Data Management Staff

- Develop data management policies, plans and procedures consistent with Department of Ecology polices, procedures and standards;

- Develop data gathering/handling, collection and tracking strategies to process all data. Develop built-in quality control checks and reports (with input from users), database integrity, database security, database backups/archival, and data submittals to Environmental Protection Agency;

(Alternate: Develop data gathering/handling, collection and tracking strategies to process data received from the local authorities. Develop built-in quality control checks and reports (with input from users), database integrity, database security, database backups/archival, and data submittals to Environmental Protection Agency;)

- Program and maintain quality control and data assurance for AIM database;
- Develop and manage database systems;
- Ensure data qualifiers specified in final report are included with any Internet data postings;
- Provide AIM database technical assistance to local authorities;
- Ensure data accessibility for end-users;
- Provide interface between Air Quality Program AIM system and Department's Facility Site System;
- Work with Quality Assurance Unit to develop computer program(s) that perform statistical analysis and other quality assurance procedures;

- Conduct computerized quality control activities on all inventory data;

(Alternate: conduct quality control activities to ensure successful loading of local agency electronic data into AIM)

- Submit inventory data to Environmental Protection Agency.

6. Data Quality Objectives, Indicators, and Targets

Emission inventories are estimates of pollutant discharges made using available tools and technology for emissions assessment. Differences in a source's day-to-day operation may impact the amount of pollution generated by an individual activity.

Data Quality Objectives (DOQ) are statements about the level of acceptable uncertainty or error. Their purpose is to ensure that the final data will be sufficient for the intended use of the inventory. A well-developed and implemented quality assurance program fosters confidence in the inventory and any resulting regulatory program. It also gives the end user important information about the limitations of the emission estimates in order to avoid misuse of data.

Data Quality Objectives ensure that the inventory quality is suitable for the specified end use(s) of the inventory. The objectives address accuracy, completeness, comparability and reasonableness. The goal of the inventory process is to provide the best possible inventory under given resource constraints. Because of varying resources, it's important to identify those objectives that are necessary to produce an inventory that makes sense. This is the minimum data quality objective. Additional effort beyond the minimum will provide inventory quality improvements with additional resources.

Data Quality Indicators (DQI) are qualitative and quantitative descriptors (measuring device or tool) used in interpreting the degree of acceptability or utility of data. Establishing acceptance criteria for the DQIs sets quantitative goals for the quality of data generated during the inventory development process.

A Data Quality Target (DQT) is an additional quality assurance tool that will provide a measure of our success in meeting our quality objectives. The DQT represents the minimum level that is acceptable at the current time. The DQT may be changed to reflect a corresponding change in the emphasis of the inventory.

6.1 Data Quality Objective: Accuracy

An accurate inventory is:

- One in which emissions estimates closely reflect the true level of contaminants released to the environment by a facility.
- One where there is agreement between the observed or estimated value and an accepted reference value.
- Each inventory data element is within accepted parameters (e.g. stack parameters and location coordinates, etc.)

(Alternate: The goal of the quality assurance process is to produce an accurate inventory by reducing uncertainty where possible, and to qualifying the emissions estimates. This will provide the end user with a basis for deciding if the inventory uncertainty is acceptable for his or her goals. The specific objectives are:

- *A qualitative assessment of the inventory including a discussion of inventory strengths and weaknesses.*

- *A semi-quantitative assessment of the uncertainty of the emissions inventory, employing relative quality ranking systems such as emissions estimation methods rankings, AP42 emission factor ratings, or the Data Attribute Ranking System (DARS).)*

6.1.1 Procedure for Achieving Accuracy Objective

Uncertainty will be reduced, and information necessary to qualify emissions estimates will be evaluated through several procedures:

- Use Emission Inventory Improvement Program preferred emission calculation methods, when available.
- Technical staff review to ensure:
  - Data is reasonable.
  - Calculations are accurate.
  - Data elements are within valid ranges.
  - Emissions estimation method codes are present.
- Computerized checks
  - Minimal data entry errors.
  - Data elements are within valid ranges.
  - Emissions estimation method codes are present.
  - Verification of emissions estimated using EPA emission factors.
  - (Alternate-add: statistical analysis as described in EPA's *EIIP Volume VI, Chapter 3 General QA/QC Methods.*
- Sensitivity Analyses to compile:
  - Pollutant totals estimated by each method: by facility, process, industry type, and statewide totals.
  - Pollutant totals estimated with EPA emission factors by emission factor ranking grades if grades become available electronically.

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In addition, the stationary point source production levels and source tests and permitted emission factors will be rechecked. The source's current operational status will also be reviewed using notices of construction, permit addenda, and Ecology (and local air authority) source inspector information.

6.1.2 Accuracy Data Quality Indicators

- Use DARS scoring for all major sources. The DARS scoring may be applied to categories of sources, instead of individual sources, as described in EPA guidance documents.
- Provide a qualitative assessment of the inventory including a discussion of inventory strengths and weaknesses.
- Quantify variability of all emissions using Emission Inventory Improvement Program guidelines.

(Alternate:

- *Compilation and assessment of data identified as outside valid range*
- *Summary of errors or discrepancies found during QA process*

- *Pollutant summaries by estimation method for individual facilities, processes, industry types, and statewide totals. The estimation methods form a general accuracy ranking of estimates.*
- *Ranking of emissions by EPA letter grade for those estimates calculated using EPA emission factors if electronically available.)*

6.1.3 Accuracy Data Quality Target

- DARS score of ≥0.8 for all point source categories. (*Alternate*: *Pollutant summaries by estimation method for individual facilities, processes, industry types, and statewide totals)*
- Ranking of emissions by EPA letter grade for those estimates calculated using EPA emission factors, if electronically available.
- Published report on inventory assessment, including strengths and weaknesses.
- Statistical test per Emission Inventory Improvement Program guidelines.
- 95% correct use of conversion factors.
- 95% of data falls within the valid data ranges. For data that remains outside of valid range after QA process, a report with an explanation of reasons why.
- Report of errors and discrepancies identified and corrective action taken.

6.2 Data Quality Objective: Completeness

A complete inventory is one that contains all information mandated by federal and state reporting requirements. A complete inventory will be in compliance with air quality regulations, and will be of maximum use to the end user. To this end, the completeness objectives of the inventory are:

- All major and synthetic minor sources of air pollution will be inventoried annually.
- All required emissions units within a facility must be tracked.
- All required data elements must be present.
- All required data elements reported to the proper oversight agency.

6.2.1 Procedure for Achieving Completeness Objective

Extensive planning should be conducted prior to data collection to identify all applicable emission sources. The goal will be to determine 100% of the emissions from the largest emitting sources.

Completeness will be addressed by:

- Checking emission inventories against prior inventories and local authority source lists to ensure all facilities have submitted inventories.
- Computerized checks to ensure all required data elements are present.
- Checking Ecology and local authority source lists against those sources listed in Ecology Facility Site System.

6.2.2 Completeness Data Quality Indicators

- Complete list of major and synthetic minor sources of air pollution in Washington.
- Complete lists of emissions units within a facility to be compared with data submitted by each facility.
- Complete list of required data elements compared with the data collected from each facility.

- Comparison with the Environmental Protection Agency Quality Assurance Plan Guidance Source Listing.

6.2.3 Completeness Data Quality Targets

- 100% of sources included in inventory.
- 100% of emissions units tracked and reported.
- 100% of required data elements reported.
- 100% of the sources in the Environmental Protection Agency guidance appropriate to the inventory conducted have been inventoried, or rationale for their omission documented.
- Explanation for any missing data or source.

6.3 Data Quality Objective: Comparability

A comparable inventory is:

- One in which similar sources, having similar processes and employing similar estimation methods, have similar emission estimates.
- One which is consistent over time (i.e. year-to-year).
- One in which similar emission estimates are derived when using surrogates.
- One that explains any difference in emissions estimates given the above conditions.

6.3.1 Procedure for Achieving Comparability Objective

To ensure that the data are comparable, standard procedures referenced in Appendix 2 will be followed and the results will be presented in the same units as the most recent base-year inventory. Checks to assess the comparability of inventory data include:

- Stationary point source estimated emission associated with any air contaminant discharge permit, Title V Permit, or DRAFT Title V for each identified point source will be reviewed in relation to similar sources. Comparison of prior year's data for each facility reviewed (may necessitate re-calculation of prior year's inventory if method or emission factor changed).
- Comparison of facility/process data to other similar facility/process data.

6.3.2 Comparability Data Quality Indicators

- Estimation techniques employed.
- Comparisons within the same facility from year-to-year where processes or estimation methods have not changed significantly.
- Presence of large (greater than five percent) discrepancies, both within a source and among similar sources.
- Crosscheck activity data by comparing it to surrogates.
- Comparison of different local authorities (i.e. peer review);
- Comparison of data from previous emissions inventories.

6.3.3 Comparability Data Quality Target

- Have similar results (within five percent) using similar estimation techniques.
- Have similar results (within five percent) within the same facility.
- Explanation for large discrepancies included in the quality assurance report.

- Activity data using surrogates within five percent.
- Results from different local authorities compare within five percent;
- Comparison of emission inventory years are within five percent;

6.4 Data Quality Objective: Reasonableness

(Alternate: Remove entire 6.4 section. Reasonableness is not part of EIIP. Checking for correct calculations and valid data ranges belongs under the Accuracy objective. Comparisons to other locals and other years' inventories belong under the Comparability objective.)

Reasonableness is a measure of the degree to which the data accurately and precisely represents the region and sources it is meant to cover. Methods and emission factors should also be representative of local conditions.
A reasonable inventory is:
- One which is intuitively correct;
- One in which calculations are correct;
- Data elements fall within expected ranges.

6.4.1 Procedure for Achieving Reasonableness Objective

To ensure that the data are reasonable, further comparisons are made. Valid data ranges will be published. Where possible, the following procedure from EPA Handbook for Criteria Pollutant Inventory Development, Appendix M will be used.
- For similar processes and chemicals, total emissions can be compared against each other or checked against appropriate emissions factors to determine reasonableness.

6.4.2 Reasonableness Data Quality Indicators

- Comparison of different local authorities (i.e., peer review);
- Comparison of data from previous emissions inventories.

6.4.3 Reasonableness Data Quality Target

- Results from different local authorities compare within five percent;
- Comparison of emission inventory years are within five percent'
- 95% of data falls within the valid data ranges.

7. Information and Data Management, Collection, and Handling Procedures

Manage information and data per *Air Quality Program Information Management Plan* and Appendix A of this document *Air Quality Program Emission Inventory Information Management Plan.*[3]

[3] *See footnote #2 at Section 5.2 above.*

(Alternate: submit inventory to the Department of Ecology in a format specified by the Department of Ecology and consistent with the Air Information Management System (AIM). Develop data gathering/handling, collection and tracking strategies to process data received from the local authorities.)

8. Engineering and Technical Procedures/Emission Estimation Procedures

Applicability: Facilities, Local Agencies and the Department of Ecology

- Provide annual emissions data using procedures EPA's *EIIP Volume II, Chapter 1-13,* wherever EIIP procedures are available.

(Alternate: provide annual emissions data.)

- All estimates must be calculated and documented using preferred, or approved alternate method as detailed in EIIP *Volume II: Point Sources- Chapters 1-13.* Methods chosen must be documented in the inventory.

(Alternate: All estimates must be calculated and documented in the inventory using valid EPA emissions estimation method codes.)

9. Quality Control Procedures and Methods

Applicability: Facilities, Local Agencies and the Department of Ecology

A complete, overall quality assurance program includes both quality control and quality assurance activities. Quality control is the system of routine technical activities implemented by inventory development personnel to measure and control the quality of the inventory as it is being developed. The Quality Control system is designed to:

- Provide routine and consistent checks and documentation points in the inventory development process to verify data integrity, correctness and completeness.
- Identify and reduce errors and omissions.
- Maximize consistency within the inventory preparation and documentation process
- Facilitate internal and external inventory review process.
- Include technical reviews, accuracy checks and the use of approved standardized procedures for emission calculation and reporting.
- Document procedures so that they leave no room for subjective interpretation.

9.1 Quality Control/Quality Assurance Methods for Level I and II Inventories:

9.1.1 Quality Control Methods to Determine Accuracy

Accuracy will be evaluated using DARS software, emissions estimation validation protocols along with other methods found in *General QA/QC Method, Volume VI: Chapter 3* of the Emission Inventory Improvement Program Guidance Documents.

(Alternate: Accuracy will be evaluated using emissions estimation validation protocols along with other methods found in General QA/QC Method, Volume VI: Chapter 3 of the Emission Inventory Improvement Program Guidance Documents. Specific procedures are given in section 6.1.1 (alternate).)

9.1.2 Quality Control Methods to Determine Completeness

Peer review and computerized checks, along with other methods found in *General QA/QC Method, Volume VI: Chapter 3* of the Emission Inventory Improvement Program Guidance Document will be used to determine completeness.

(Alternate addition: specific procedures are given in section 6.1.2 (alternate).)

9.1.3 Quality Control Methods to Determine Comparability

In addition to methods found in *General QA/QC Method, Volume VI: Chapter 3* of the Emission Inventory Improvement Program Guidance Documents, the following methods will be used:

- Use standardized checklists to assess the adequacy of the data and procedures at predetermined intervals in the inventory process;
- Use checklists to monitor the following procedures and tasks: data collection
- Evaluate computerized, statistical evaluation of comparisons made in Section 6.3.1

(Alternate remove above bullets and add: specific procedures are given in section 6.1.2 (alternate).)

9.1.4 Quality Control Methods to Determine Reasonableness

(Alternate: remove this section. See alternate under section 6.4)

In addition to methods found in *General QA/QC Method, Volume VI: Chapter 3* of the Emission Inventory Improvement Program Guidance Document, the following methods will be used:

(Note: this Checklist is taken from EIIP Volume II, Chapter 1 and Appendix D)

- Complete Reasonableness checks on Checklist 5 (Appendix 1)
- Answer true or false to range listings found on Checklist 6 (Appendix 1)
- Verify data elements are within ranges found on Checklist 7 (Appendix 1)

9.1.5 Document/Data Tracking Method (Sample in Appendix 4)

- The whereabouts of each inventory is tracked manually and electronically in the Document Tracking folder

- Inventory documents are signed in and out in at least one location
- Weekly updates provide confirmation that documents are flowing through the system
- Any inventory that has not been actively transferred within a week is double checked for location

(Alternate: preface these bullets with: These procedures apply to the Dept. of Ecology headquarters. Individual local authorities develop their own tracking systems.)

10. Quality Assurance Program

Quality assurance activities are more comprehensive than quality control activities because they include assessments of the effectiveness and appropriateness of the quality control activities.

Quality assurance activities are broader in scope than, and include, quality control. Quality assurance activities provide an additional assessment of data quality because staff is not directly involved in the development of the inventory. The Quality Assurance program consists of external activities that include a planned system of review and audit procedures by personnel not actively involved in the inventory development process. The key concept of this component is independent objective review by a third party to access the effectiveness of the internal Quality Control program and the quality of the inventory, and to reduce or eliminate any inherent bias in the inventory process.

10.1 Performance Audits

The purpose of performance audits is to verify that the quality control procedures were performed appropriately.

To that end, the Emission Inventory Coordinator (Sally Otterson) will verify and duplicate the quality control process for all emissions related data included in the inventory.

(Alternate: The Quality Assurance Coordinator will audit the Ecology quality assurance technical staff to determine whether the QA procedures in this plan have been followed.)

Performance audits to be completed (refer to *General QA/QC Method, Volume VI: Chapter 3* of the Emission Inventory Improvement Program Guidance Documents) annually or more often if necessary:

- Reality checks
- Peer review
- Sample calculations
- Computerized checks
- Statistical checks
- Independent audits
- Emissions estimation validation

The Quality Assurance Coordinator (Stan Rauh) will audit each source type and each local authority.

10.2 System Audits

The purpose of a system audit is to review the entire emission inventory process and to assess its compliance with established procedures, including emission estimation procedures and calculation, validation, data collection and reporting.

System audits to be completed (Refer to *General QA/QC Method, Volume VI: Chapter 3* of the Emission Inventory Improvement Program Guidance Documents):

- Sensitivity analysis, to be sure efforts and resources are focused properly. The summary should include pollutant totals estimated by each method (facility, process, industry type and statewide totals) and pollutant totals estimated with Environmental Protection Agency emission factors by emission factor ranking.
- Statistical evaluations.

11. Emissions Inventory Data Quality Assessment Statement

At the conclusion of the quality assurance procedures, the inventory will be evaluated according to the data quality objectives. The results of the evaluation will be used to make a statement on the suitability of the inventory for its various end uses. The evaluation will become part of the annual quality assurance report. Qualitative evaluations of each objective will be given. In addition, a semi-quantitative evaluation of uncertainty will be made.

11.1 Accuracy Assessment

A qualitative discussion of accuracy will include a summary of whether any data identified as outside of its valid range remained outside of the valid range in the final inventory. If any data remained outside of its valid range, an explanation will be given. The qualitative discussion will also include a summary of errors or discrepancies identified in the quality control/assurance checking process.

The semi-quantitative discussion of accuracy will consist of pollutant summaries by estimation method for individual facilities, processes, industry types, and statewide totals. The estimation methods form a general accuracy ranking of estimates. For those estimates calculated using Environmental Protection Agency emission factors, a further ranking using Environmental Protection Agency letter grades may be made.

Where available, a semi-quantitative method such as DARS will be used to grade the inventory.

11.2 Completeness Assessment

A statement will be prepared assessing whether all required facilities and data elements were included in the inventory. If any facilities were not included, an explanation of the omission will be provided. If any individual data elements were not provided a discussion of the elements and frequency of omissions will be provided.

11.3 Comparability Assessment

Several summations of emissions data will be made to address comparability. Overall percentage differences for individual facilities (current year to prior year), industry types, processes, and statewide inventory will be calculated. Explanations of any large differences will be made.

11.4 Reasonableness Assessment

(Alternate: remove this section. See alternate under section 6.4)

A reasonableness check will be performed on the estimated emissions, activity levels, and emission factors using the previous years inventory and other special inventories as background comparisons.

- Answer the following questions:
- How do the magnitudes of calculated emissions compare with other source categories?
- Were magnitudes compared with national/state ranks of source categories?
- Were other inventories and/or national averages compared to AIRS?

(Alternate: this paragraph could be dispersed among sections 11.1 to 11.3. Because this happens at the local authority, errors will be corrected before submission to Ecology.)

12. Corrective Action

Corrective and follow-up actions identified during the quality assurance process and audit process will be documented by the Quality Assurance Coordinator (Stan Rauh). Actions applicable to Ecology staff will be referred to the appropriate staff. Actions requiring local authority attention will be referred to the authority. Corrective action is an iterative process. Both the corrective actions identified and results of actions taken in response will be documented for inclusion in the quality assurance final report.

13. Emissions Inventory Data Quality Assurance Final Report

A final report will be issued annually summarizing the results of the quality assurance procedures and program review. The report will be distributed to local authorities and appropriate Ecology sections. The report will include:

- An assessment of the limitations and appropriate uses of the inventory data
- Suggestions for inventory improvement based on the results of the quality assurance process
- Recommendations for improvements to the quality assurance program
- A section encouraging good inventory practice, including comparison of permits and inventory data, use of the latest estimation methodologies, and stressing familiarity with documents being produced by the Emission Inventory Improvement Program.

14. Training

- All personnel that acquire, review, enter, audit or access, emission data will be screened to insure they are experienced and qualified.
- Emission inventory personnel will receive sufficient training in their appointed jobs to contribute to the gathering, processing, entering, and auditing (either Quality Control or Quality Assurance) of complete and high quality data.
- Workshops and courses will be provided by the Emission Inventory Coordinator (Sally Otterson) or other sources when necessary.
- Prior to processing data in the Air Information Management (AIM) system, members of the inventory team will attend training sessions where Quality Assurance personnel will familiarize them with the standards, procedures, and technical aspects of the emission inventory process.
- As the lead organization, the Air Quality Program will provide this training and familiarization to all emission inventory personnel (including local air pollution agency staff where appropriate). Included in the training will be documentation and reference materials (including an AIM Users Manual) to assist the staff. The documentation will have hands-on examples of the process of emission inventory collection, processing and auditing. These manuals will act as a guide to the emission inventory process including estimation, Quality Control/Quality Assurance, DARS calculation, and entering and retrieving data from the AIM system. The manuals will be updated when necessary.
- Meetings will be held before and after the annual inventory to discuss the items on the audit checklist and Quality Control/Quality Assurance requirements specified in this document. In addition to these strategy meetings, training/workshops will be held as necessary. Engineers and other specialists performing the inventory audits and checks are encouraged to keep their skills honed through personal study and research.

The Emission Inventory Coordinator (Sally Otterson) will conduct additional training when audits reveal the need for more Quality Control measures or revision of existing procedures.

(Alternate: The Quality Assurance Coordinator will conduct…)

Occurrences that may lead to additional Quality Assurance training include the following:

- An audit revealing a lack of understating of Quality Control/Quality Assurance requirements or the need to develop additional Quality Control measures.
- An audit revealing the need to provide guidance on acceptable data handling procedures because data are not maintained in a manner that allows easy verification of the accuracy of emission results and source of the supporting data.
- An audit revealing unacceptable data documentation practices that lead to entry errors and an inability to recreate emission results.
- An audit revealing that the internal data review does not adequately control data entry and calculation errors.
- The manager requesting Quality Assurance training for new team members.

The Emission Inventory Coordinator will conduct the training and maintain records of each training session.

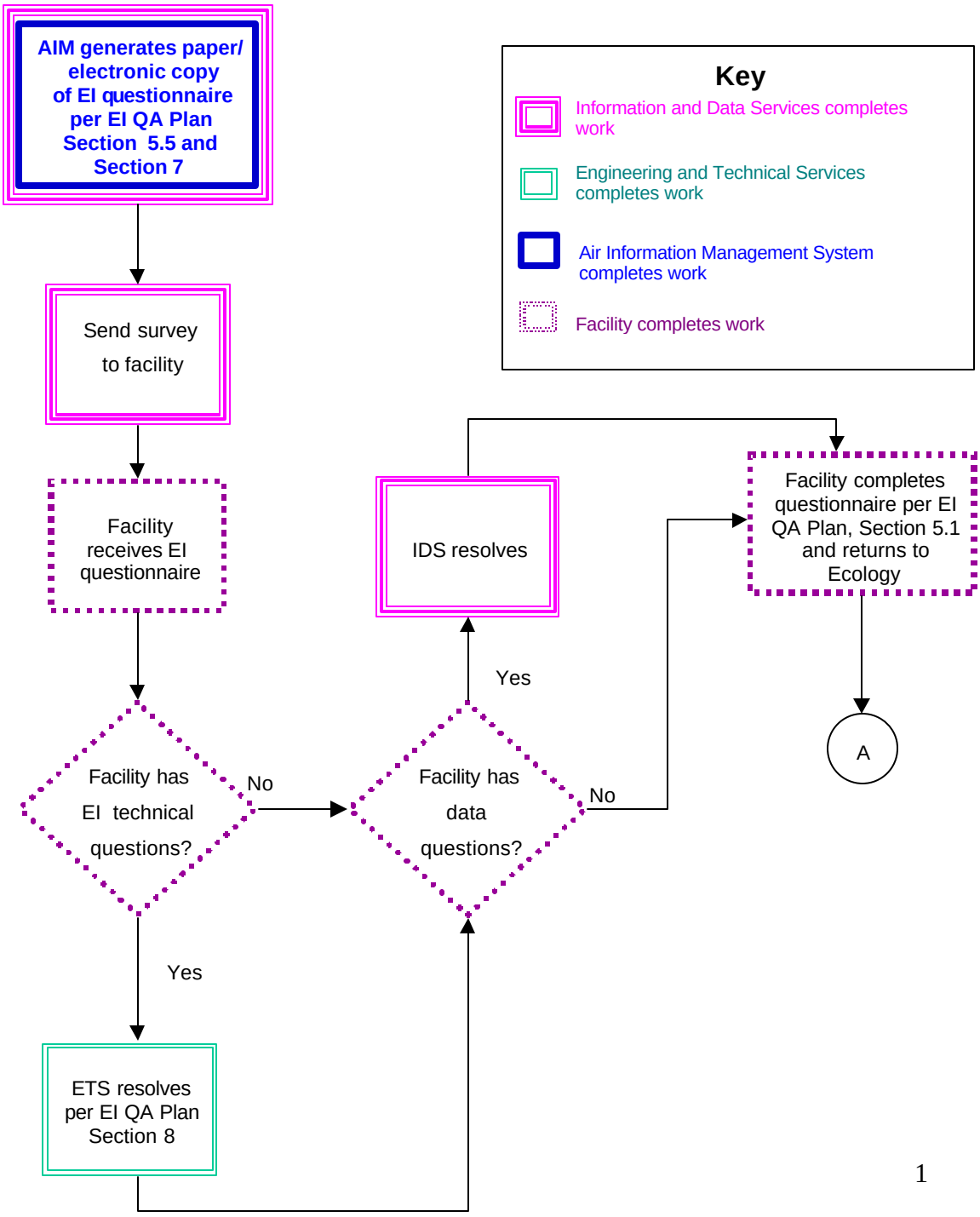
(Alternate: As appropriate, the Quality Assurance Coordinator or Emissions Inventory Coordinator will conduct….)

Appendices

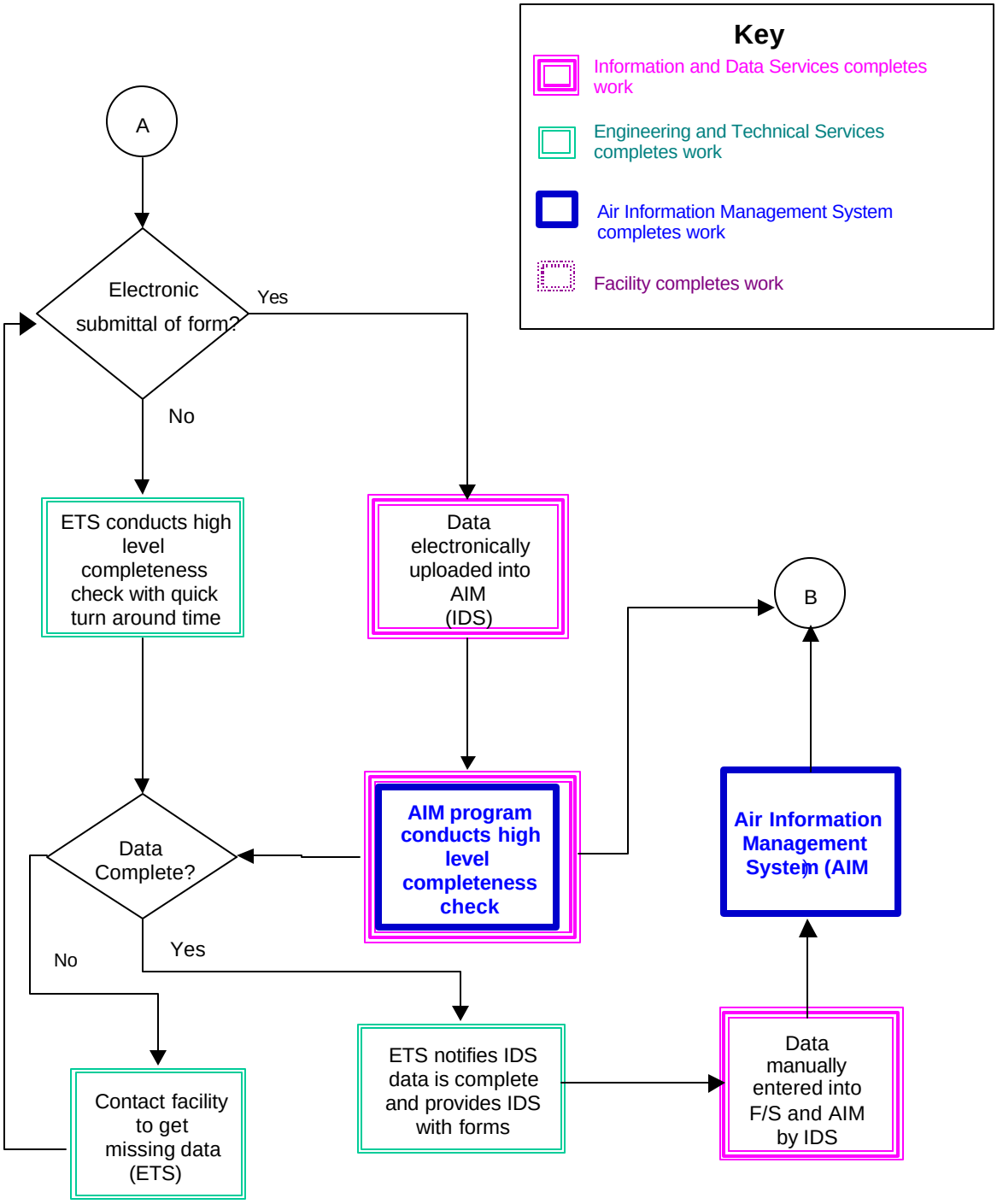
Appendices 1, 2, and 4 are in a separate file called: Appendix_72

Appendix 3: Inventory and Quality Assurance Flow Chart

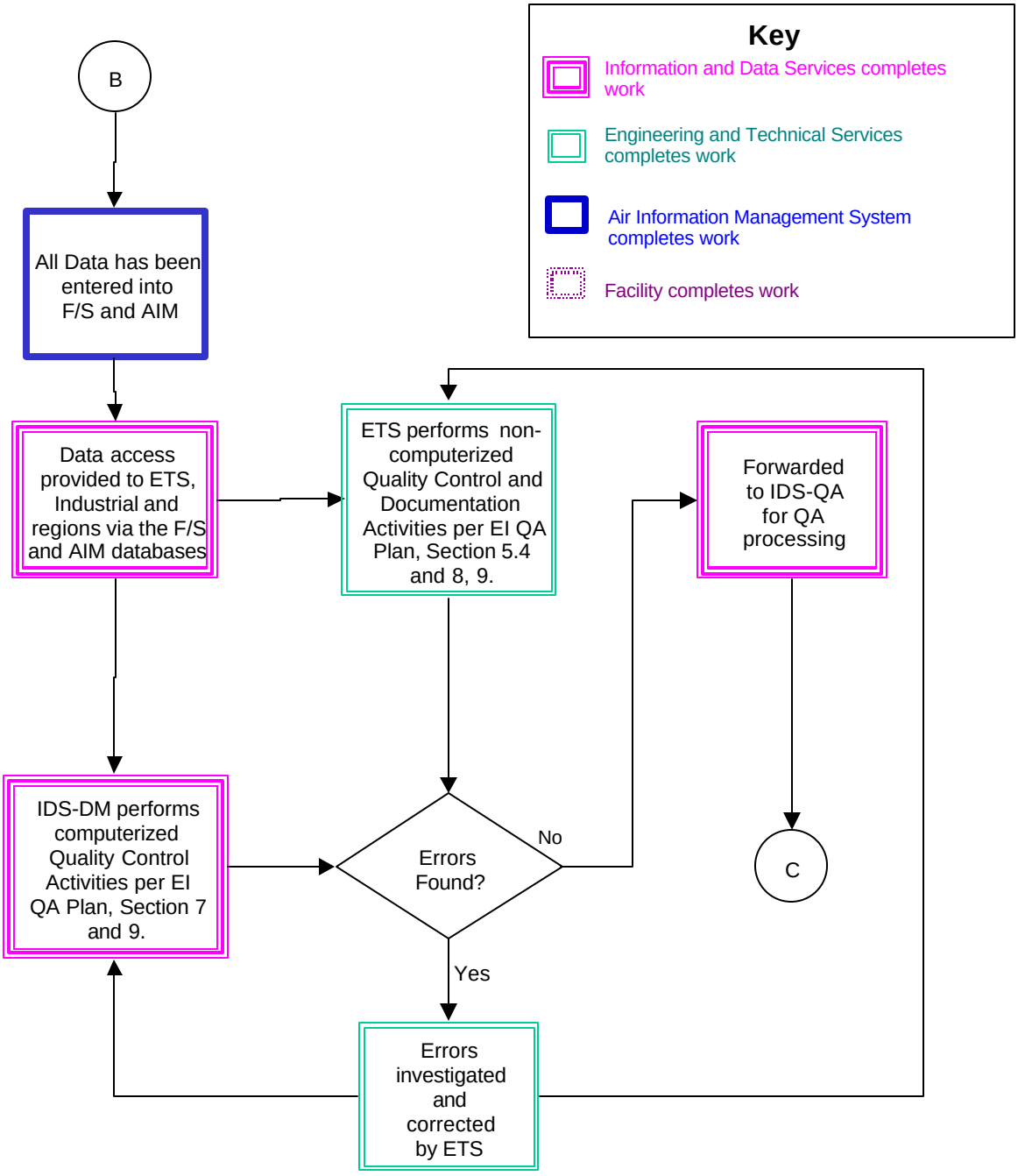
Appendix 3
Inventory and Quality Assurance Flow Chart
for Department of Ecology Sources



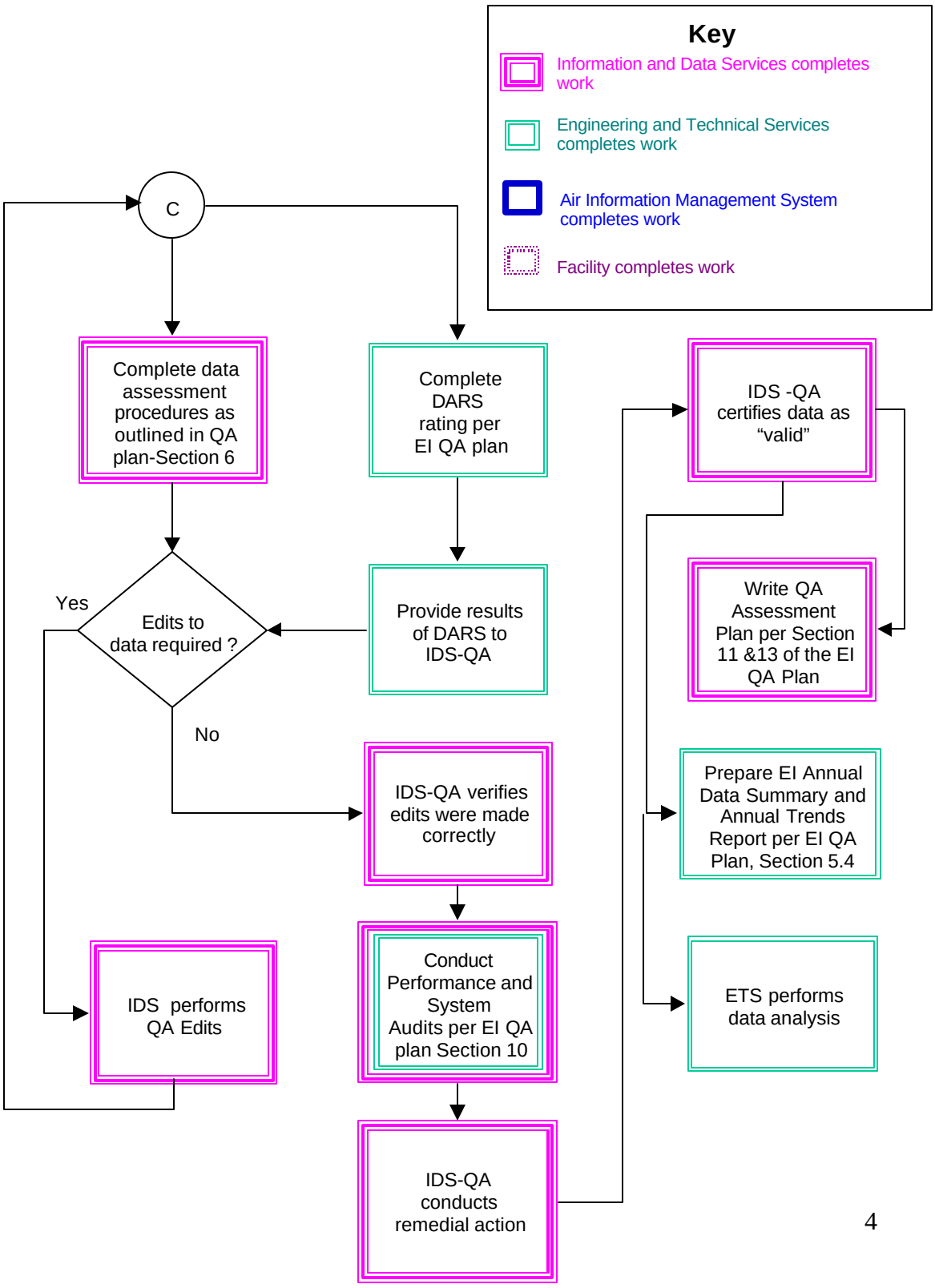
1


Key
Information and Data Services completes work
Engineering and Technical Services completes work
Air Information Management System completes work
Facility completes work
A
Electronic submittal of form?
Yes
No
ETS conducts high level completeness check with quick turn around time
Data electronically uploaded into AIM (IDS)
B
AIM program conducts high level completeness check
Air Information Management System (AIM
Data Complete?
No
Yes
ETS notifies IDS data is complete and provides IDS with forms
Data manually entered into F/S and AIM by IDS
Contact facility to get missing data (ETS)

2


Key
Information and Data Services completes work
Engineering and Technical Services completes work
Air Information Management System completes work
Facility completes work
B
All Data has been entered into F/S and AIM
Data access provided to ETS, Industrial and regions via the F/S and AIM databases
ETS performs non-computerized Quality Control and Documentation Activities per EI QA Plan, Section 5.4 and 8, 9.
Forwarded to IDS-QA for QA processing
IDS-DM performs computerized Quality Control Activities per EI QA Plan, Section 7 and 9.
Errors Found?
No
Yes
C
Errors investigated and corrected by ETS

3


Key
Information and Data Services completes work
Engineering and Technical Services completes work
Air Information Management System completes work
Facility completes work
C
Complete data assessment procedures as outlined in QA plan-Section 6
Complete DARS rating per EI QA plan
IDS -QA certifies data as "valid"
Yes
Edits to data required ?
Provide results of DARS to IDS-QA
Write QA Assessment Plan per Section 11 &13 of the EI QA Plan
No
IDS-QA verifies edits were made correctly
Prepare EI Annual Data Summary and Annual Trends Report per EI QA Plan, Section 5.4
IDS performs QA Edits
Conduct Performance and System Audits per EI QA plan Section 10
ETS performs data analysis
IDS-QA conducts remedial action

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